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Application No. 03 016 683.9 - 2211	Ref. BB 49937	Date 08.03.2007
Applicant MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.		

Communication pursuant to Article 96(2) EPC

The examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(1) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period

of 4 months

from the notification of this communication, this period being computed in accordance with Rules 78(2) and 83(2) and (4) EPC.

One set of amendments to the description, claims and drawings is to be filed within the said period on separate sheets (Rule 36(1) EPC).

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Article 96(3) EPC).



Lelait, Sylvain
Primary Examiner
for the Examining Division

Enclosure(s): 7 page/s reasons (Form 2906)

**Bescheld/Protokoll (Anlage)****Communication/Minutes (Annex)****Notification/Procès-verbal (Annexe)**

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The examination is being carried out on the **following application documents**:

Description, Pages

1, 4-54	as originally filed			
2, 3	received on	14.12.2005	with letter of	09.12.2005

Claims, Numbers

39-41	as originally filed			
1-38	received on	14.12.2005	with letter of	09.12.2005

Drawings, Sheets

1/71-71/71	as originally filed
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1 Used documents

1.1 Reference is made to the following document; the numbering will be adhered to in the rest of the procedure:

D4: EP-A-0 947 923 (NIPPON ELECTRIC CO) 6 October 1999 (1999-10-06)

1.2 The following documents are cited by the examiner (see the Guidelines, C-VI, 8.7). Copies of the documents are annexed to the communication and the numbering will be adhered to in the rest of the procedure:

D5: EP-A2-0 806 725 (GOEBEL KURT J.) 12 November 1997 (1997-11-12)

D6: EP-A2-0 633 526 (NEC CORPORATION) 6 July 1994 (1994-07-06)

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- 1.3 These documents relate to compilers, and are therefore from the same technical area as the application. Thus, these documents are known to the person skilled in the art.

2 Summary of the communication

- 2.1 Amendments to the claims are admissible, Article 123 and Rule 86 EPC. Claims 1, 37 and 38 are not new, Article 54 EPC, as a consequence the application lacks unity, Article 82 EPC. Claims 1, 37 and 38 are not clear, Article 84 EPC.

3 Admissibility of the amendments, Article 123 EPC and Rule 86 EPC

- 3.1 The amendments files by the applicant with letter dated 9 December 2005 are admissible as they do not introduce subject-matter which extends beyond the content of the application as filed, Article 123(2) EPC, and as they do not introduce unsearched subject-matter, Rule 86(4) EPC.

4 Lack of unity, Article 82 EPC

- 4.1 The objections made in the communication dated 8 September 2005 still hold as claim 1 lacks novelty, Article 82 EPC.

5 Lack of clarity, Article 84 EPC

- 5.1 The application does not meet the requirements of Article 84 EPC, because claims 1, 37 and 38 are not clear.
- 5.2 Claim 1 is not clear because the wording "*machine instructions*" is not specific enough. The wording in itself and also the wording of claim 1 "*a code generation step of converting the optimized intermediate codes into machine language instructions*" when put in concordance with the description on page 37, lines 26-29 where "*The*



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code generation unit generates the machine language program" lead to assume that these machine instructions are assembly instructions. But these machine instructions are processed by the optimisation unit together with the intermediate codes produced by the intermediate code generation, thus these machine language instructions must be in some way in an intermediate form to allow the optimiser to perform its processing. These are thus not assembly instructions as also confirmed in the description on page 37, lines 26-29 "*The code generation unit generates the machine language program, replacing all the intermediate codes (including codes of the function call and optimized machine language instructions...*". Hence there is a contradiction inside claim 1. From the general overview of the compiler and the description of the optimisation step it is assumed that these machine instructions are some kind of intermediate codes close to the assembly in the sequel of this communication. The applicant is asked to modify claim 1 to get rid of this contradiction,

5.3 Another problem then arises when considering the real form of these machine instructions. It is not clear if the machine instructions processed by the optimisation unit are register allocated or not. On one hand in Figure 38-72 it seems that the code defined in the operation definition information and the function definition file used to produce the machine instructions in the substitution step are register allocated (although the *vr* registers do not appear in Table 1 of the description leaving the reader in doubt about the signification of this notation), and on the other hand in the description it is disclosed that the optimisation step performs register allocation on these machine instructions, like for instance on page 40, lines 12-17: "*Then, the generated machine language instruction including the neighboring codes become a target of optimization such as... allocating register in the optimization unit...*". The applicant is asked to clarify the status of the machine instructions. It is assumed in the sequel of the examination that these machine instructions are register allocated until the optimisation unit virtualises the registers in order to redo the register allocation for the whole intermediate codes.

5.4 The same reasoning applies, *mutatis mutandis*, to the corresponding independent claims 37 and 38, which are therefore also considered not clear, Article 84 EPC.



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6 Independent claim 1 - Lack of novelty, Article 54 EPC

6.1 The present application does not meet the requirements of Article 52(1) EPC, because the subject-matter of claim 1 is not new in the sense of Article 54(1) and (2) EPC.

6.2 The document D1 discloses (the references in parentheses applying to this document):

A compiler that translates a source program into a machine language program (page 15, left column, paragraph 3: "The Sun SC4.0 C compiler..."), including operation definition information in which operation that corresponds to a machine language instruction specific to a target processor is defined (page 15, left column, paragraph 3: "...support macros that generate VIS instructions"), comprising:

a parser step of analyzing the source program (page 15, left column, paragraph 3: "The Sun SC4.0 C compiler...", parsing is part of every optimising compiler);

an intermediate code conversion step of converting the analyzed source program into intermediate codes (page 15, left column, paragraph 3: "The Sun SC4.0 C compiler...", generating an intermediate representation is part of every optimising compiler);

an optimization step of optimizing the converted intermediate codes (page 15, left column, paragraph 3: "...the compiler automatically performs various optimizations on the resulting code"); and

a code generation step of converting the optimized intermediate codes into machine language instructions (page 15, left column, paragraph 1: "...the compiler generates the assembly code..."),

wherein the intermediate code conversion step includes:

an intermediate code generation sub-step of generating intermediate codes from the source program; characterized in that the intermediate codes generated by the intermediate code generation sub-step include machine language instructions (page 15, left column, paragraph 3, generating an intermediate representation and instruction selection are part of every optimising compiler); and



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the intermediate code conversion step further includes:

a detection sub-step of detecting whether or not any of the intermediate codes refer to the operation definition information (page 15, left column, paragraph 3: "the compiler simply replaces them with the corresponding VIS instructions", if the compiler replaces the VIS macros by VIS instructions, it must detect them first); and

a substitution sub-step of substituting the intermediate code with a corresponding machine language instruction, when the intermediate code is detected (page 15, left column, paragraph 3: "the compiler simply replaces them with the corresponding VIS instructions"), and

the optimization step comprises optimizing a machine language instruction sequence including both the machine language instruction generated in the intermediate generation sub-step and the corresponding machine language instruction substituted in the substitution sub-step (page 15, left column, paragraph 3: "This mechanism...leaving the details of Instruction scheduling and register allocation to the compiler." shows that some optimisations are performed on the whole intermediate representation (scheduling and register allocation are part of the optimisations disclosed in the description) and "For example, the C statement `c=vis_fpadd(a,b)` becomes a single VIS instruction, `fpadd16`, and the compiler automatically performs various optimizations on the resulting code". Thus the code on which optimisations are performed contains also machine language instructions. These two passages show that optimisations are performed on a mix of machine instructions generated by the substitution step and other intermediate codes).

The subject-matter of claim 1 is therefore not new (Article 54(1) and (2) EPC).

6.3 The skilled person is aware that the structure of an optimising compiler is made of a parser, an intermediate code generator, optimisers and a code generator. As an example the applicant can refer to Figure 14 of document D4, and also to Figure 1 and column 1, lines 19-40 of document D6 to get a picture of a conventional optimising compiler.

6.4 The same reasoning made with document D1 can be made with document D5 page



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2, line 30.- page 6, line 25.

7 Independent claims 37 and 38 - Lack of novelty, Article 54 EPC

- 7.1 The same reasoning applies, mutatis mutandis, to the corresponding independent claims 37 and 38, which are therefore also considered not new, Article 54 EPC.

8 Formal requirements

- 8.1 To meet the requirements of Rule 27(1)(b) EPC, the documents D4 to D6 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

9 Final remarks

- 9.1 At least some of the objections raised above are such that there appears to be no possibility of overcoming them by amendment. **Refusal** of the application under Article 97(1) EPC is therefore to be expected.
- 9.2 Should the applicant nevertheless regard some particular matter as patentable, an independent claim should be filed taking account of Rule 29(1) EPC. The applicant should also indicate the difference of the subject-matter of the new claim vis-à-vis the state of the art and the significance thereof. By making the subject-matter of a new claim new over document D1, the applicant should also ensure that the subject-matter of this new claim is new over document D5 and inventive over a combination of documents D1 and D5. If it follows again that no claim is allowable, **summons to oral proceedings** should be expected by the applicant,
- 9.3 In order to facilitate the examination of the conformity of the amended application with the requirements of Article 123(2) EPC, the applicant should clearly identify the amendments carried out, irrespective of whether they concern amendments by



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addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based (see Guidelines E-II, 1).

- 9.4 When filing amended claims the applicant should at the same time bring the description into conformity with the amended claims. Care should be taken during revision, especially of the introductory portion and any statements of problem or advantage, not to add subject-matter which extends beyond the content of the application as originally filed (Article 123(2) EPC).